



Electromagnetic Physics Testbed

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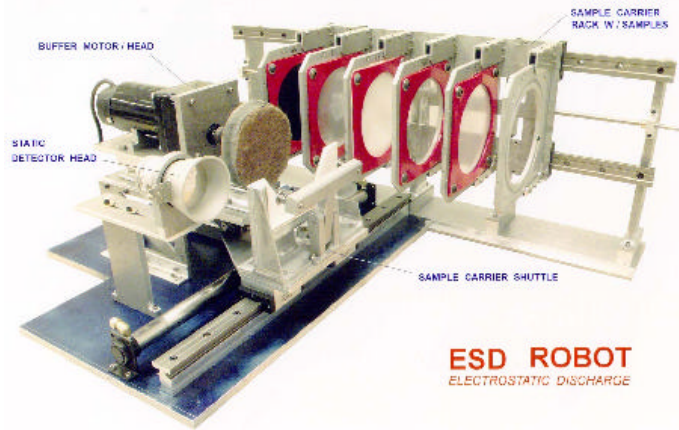
Electromagnetic Physics Testbed



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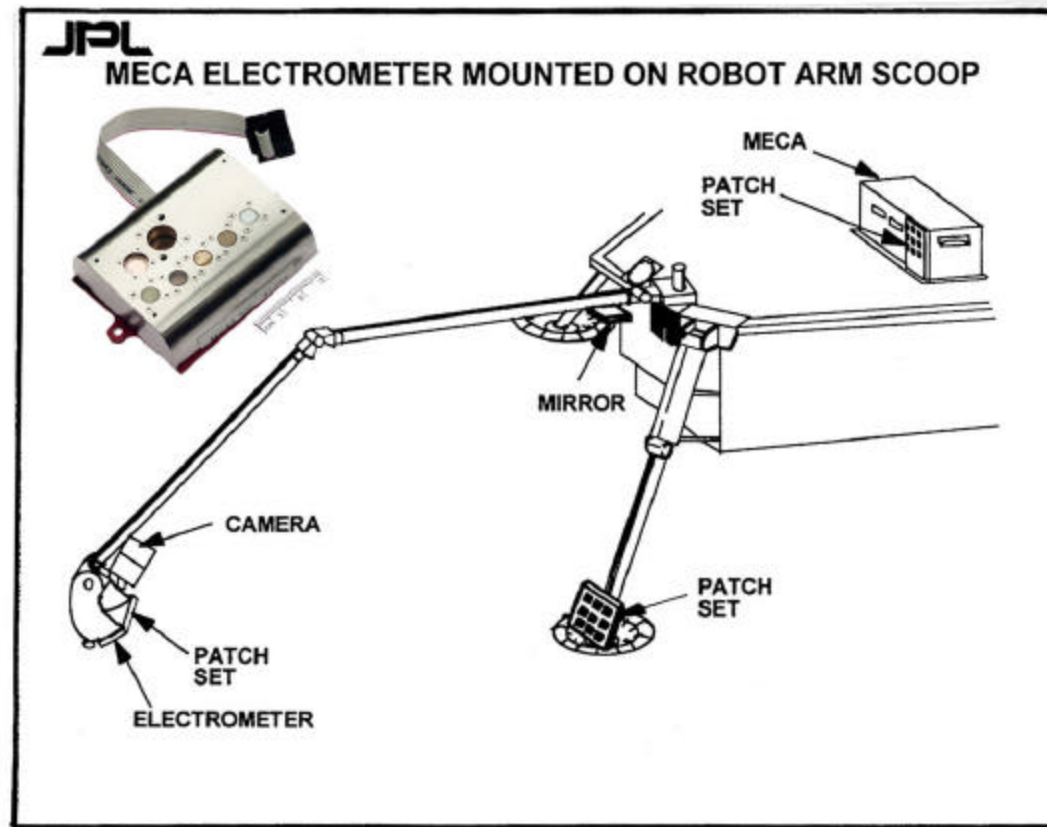
- Electrostatics studies and materials characterization to assist in issues related to electrostatic charge generation and prevention in the shuttle, international space station, and payload work areas.
- Development, Testing, and Calibration of Electrostatic Instrumentation for Planetary Missions (JPL collaboration).
- Electrostatic characterization of Mars and Lunar simulant soils and their interaction with different materials under simulated environmental conditions.
- Facilities:
 - Mars Electrostatic Chamber
 - ✦ 0.3 mb to 1013 mb
 - ✦ -123 °C to +200 °C
 - Dust and Sand Delivery Mechanisms
 - Automated Triboelectric Equipment





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■ MECA flight electrometer (with JPL)

The *Mars environmental compatibility assessment* project's electrometer was jointly developed at JPL and KSC to facilitate the characterization of the electrostatic properties of different types of insulating materials that are likely to be used on future unmanned and manned explorations of Mars.



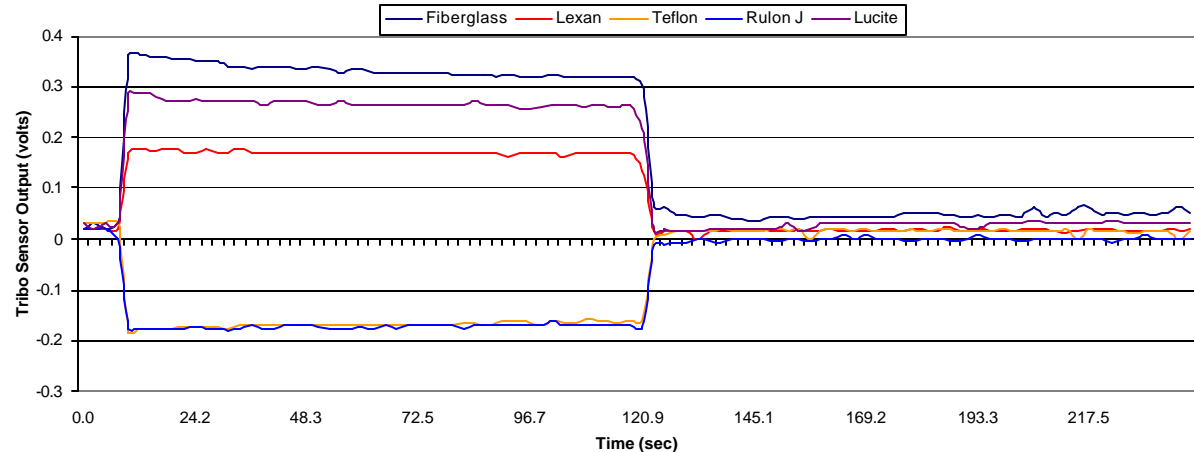
Current Projects

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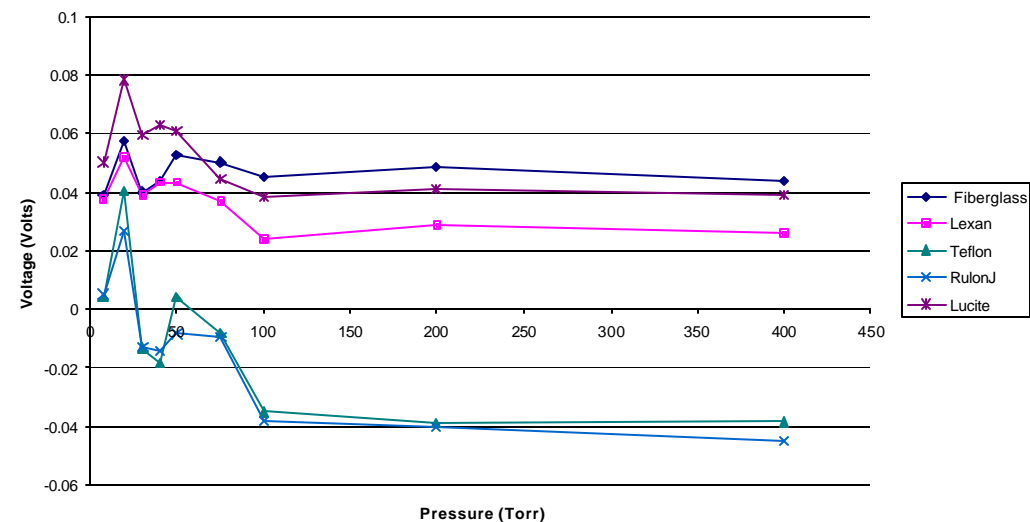
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- Calibration and Testing of the MECA Electrometer
- Determination of the Electrostatic Properties of Martian Simulant Dust and Soil Particles
- Determination of the Electrostatic Properties of Lunar Dust and Soil Particles

Using an AC Corona Discharge to Neutralize Insulator Surfaces Charged by Rubbing with Teflon-coated Wool at 10 mbar CO₂. File: ELE2000-6-7 88-Run11



Data from Rocking Chamber using Mars soil simulant in CO₂
Data from 6-29 and 7-6-2000



Proposed Projects



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■ **Dust Free Surface Research** (with JPL and LaRC)

To develop methodologies for the development of smart materials that repel dust for use on solar cells, viewing ports, space suits, filters and moving parts.

■ **Determination of the Charge, Mass, and Size of Dust Particles in Vacuum** (with JPL, Florida Institute of Technology, and Ohio University)

This work is directed at developing an instrument based on JPL's CMOS Active Pixel Sensor (APS) array that could measure the electrostatic charge on a dust particle with a sensitivity of 0.5 picocoulomb, as well as its size and mass.

■ **Effects of Static Charging on the Movement of Terrestrial Microorganisms between Spacecraft Components under Simulated Martian Conditions** (with JPL and Dynamac Corp.)

To model the effects of static charging on the movement of bacterial spores and ultra-fine dust particles containing bacterial spores between spacecraft components under simulated Martian conditions.



Proposed Flight Experiments

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■ **TriboCan Experiment (with JPL)**

Detects charge accumulation on materials in the martian environment, correlates wind speed and direction with triboelectric charging and charged particle deposition (Proposed for MITCH).

■ **Paschen/Ionization Experiment (with JPL)**

Determines breakdown characteristics, type of ions present in the atmosphere, and the presence of dust in the Martian atmosphere (Proposed for MITCH).

■ **Electrostatics on the Mars Ascent Vehicle Launch Environment**

Electrostatic sensors placed at MAV launch pad to provide information on electrostatic charging phenomena.

■ **Mars Sounding Rocket Science Payload (with JPL, U. Arizona, and Ames)**

Proposal to design, develop, fabricate, test, and integrate a science payload for the proposed addition to PROMISE. The payload will consist of electrostatic sensors symmetrically mounted on the nose cone of a Mars sounding rocket to determine the electrostatic properties of the Martian atmosphere as a function of atmospheric pressure.



Contacts

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